

# CHEVRON RICHMOND REFINERY

## TENTATIVE ORDER AND NPDES PERMIT

### REQUEST FOR *COMPLIANCE SCHEDULE* AND DEMONSTRATION OF INFEASIBILITY TO ACHIEVE IMMEDIATE COMPLIANCE WITH CALCULATED EFFLUENT LIMITATION FOR **NICKEL**

#### Executive Summary

Pursuant to discussions with staff and to §2.1 of the SWRCB's *Policy for Implementation of Toxics Standard for Inland Surface Waters, Enclosed Bays, and Estuaries of California* [the "SIP"], Chevron submits as an addendum to its NPDES permit application a request for a compliance schedule and Chevron's documentation that it is infeasible to meet the final limits for nickel proposed in the RWQCB's tentative order.

#### Infeasibility Demonstration.

In support of its request, Chevron submits the following demonstration that it is infeasible to achieve immediate compliance with 34 ug/L (AMEL) and 59 ug/L (MDEL) for NICKEL.

As defined in the SIP, infeasible means

“not capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors”

In this case, the SIP defines a “reasonable period of time” to be “immediate.” Therefore, in cases where, as here, the actions needed to achieve compliance could not be implemented by the permit’s effective date, they could not be completed within a reasonable period of time. In addition to this timing factor, possible actions to achieve compliance must be evaluated in light of the defined factors to determine their feasibility.

Staff has calculated a proposed final Water Quality Based effluent of 34 ug/L (AMEL) and 59 ug/L (MDEL). Chevron’s performance history relating to this constituent reflects that Chevron’s effluent does not meet this limit. Further, as explained in greater detail below, Chevron has undertaken a variety of efforts to

date to reduce its discharge loading as much as possible and cannot achieve immediate compliance with the proposed final limits for the following reasons:

- Source of the contaminant is generally known, as described elsewhere in this document, but we need to develop additional information on the quantity and variability of the principle source(s) before we can develop additional appropriate measures for control
- Because is generated from several sources in the refinery but at levels already below what treatment technology is expected to achieve, additional treatment at the sources is currently deemed both ineffective and impractical
- If any major projects were to be generated as the result of identifying additional practical treatment or source control technologies, we would have to go through a permitting process and might trigger CEQA and an environmental impact analysis. Permitting and CEQA processes can be very time consuming.
- A detailed program to develop alternative feasibility technologies may be required, as outlined below.

Given the efforts to date, it is unclear what additional actions and measures may be necessary to meet that limit. A number of steps will be needed to determine what actions may be necessary and feasible in order to achieve compliance with this limit. Those steps will involve additional studies to evaluate future options, and those studies may demonstrate that new technology or new methods are necessary, appropriate and feasible. For example, Chevron may evaluate options, using criteria such as the following:

- Known, demonstrated technology that is available and has been demonstrated in refineries or related industries;
- Ability to achieve required effluent levels;
- Ability to pilot or demonstrate the technology in Chevron's plant;
- Implementation time for a given technology;
- Feasibility and cost effectiveness.

Certainly, carrying out these steps will be costly and time-consuming and may require additional environmental analyses and permits. In any case, they can not be completed and implemented in time for this permit to go into effect.

Nickel is a CWA §303(d)-listed constituent. Its presence in the refinery wastewater occurs at very low levels (<50 ug/L in the effluent). Nickel tends to be ubiquitous in the region, and stormwater as well as Chevron's makeup water from EBMUD, and it is present in alloys used in refinery process equipment.

Because nickel is a §303(d)-listed constituent, ultimately a final limit for nickel will be based on a TMDL and a waste load allocation (WLA) for the refinery. Notwithstanding that the TMDL has not been completed, the permit writer has proposed a WQBEL for nickel in the tentative order of 34 ug/L average monthly effluent level (AMEL) and 59 ug/L maximum daily effluent level (MDEL). Chevron cannot consistently comply with the AMEL and MDEL limit today or in the near future.

In the following sections Chevron will document:

- A. Diligent efforts made to quantify pollutant levels in the discharge and the sources of the pollutant in the waste stream, and the results of those efforts;
- B. Source control and/or pollution minimization efforts currently underway or completed;
- C. A proposed schedule for additional or future source control measures, pollution minimization actions, or waste treatment;
- D. A demonstration that the proposed schedule is as short as practicable.

A. Pollutant Levels and Sources.

Final Limits.

The proposed WQBEL final limits for nickel are:

AMEL: 34 ug/L  
MDEL: 59 ug/L

Effluent data:

Nickel is monitored monthly in refinery effluent. Table 1.0 summarizes nickel data for the last three years. These data show:

- The average effluent nickel was 21 ug/L
- The maximum observed value was 43 ug/L
- The 99.87%tile of nickel observations during the life of the permit is estimated to be 87.4 ug/L assuming a log normal distribution.

These data show that we cannot consistently comply with the proposed final limits currently or in the near future.

Sources:

Sources of nickel to the Effluent Treatment System include the following: corrosion of copper/nickel (Cu/Ni) alloy bundles in cooling water service, water generated during catalyst changes (specifically wet dumps), potable and

reclaimed water, groundwater, and as a natural occurring component of crude oil.

- Cu/Ni Alloy Bundles: Copper/Nickel alloy bundles are located in many locations throughout the Refinery's process units. Cooling water service constitutes the majority of Cu/Ni bundles. These bundles may corrode as a result of exposure to re-circulating water; circulated between process heat exchangers and the cooling water towers. Blowdown from cooling water towers is discharged to the Effluent Treatment System and may contain small amounts of corrosion by-products. Blowdown is necessary to maintain operational control limits on total dissolved solids.
- Catalyst Changeouts: Another source of nickel arises from water generated during catalyst change outs. Not all catalyst change-outs have associated wastewater generation, particularly precious metal catalysts, where it is economic to recycle the metals. Most other catalyst change outs involve water. To a limited extent, nickel chemically plates onto certain catalysts in the hydrocracking process where heavy feeds are converted to lighter high value product (although this process is more important as a source of the nickel in refinery effluent). A "wet dumping" process is used to remove catalyst from the reactor at the end of the catalyst life during the chemical cleaning process. This wet dumping process is required due to the need for high-pressure water to dislodge the catalyst from the column and for safety in catalyst handling. The catalyst/water mixture is then processed to separate, and remove, the catalyst for hazardous waste disposal in a clarifying process. The clarified water containing small concentrations of metals is then assessed for discharge to the Effluent Treatment System.
- Groundwater: As part of the Groundwater Protection System (GPS) groundwater is extracted along the Refinery's perimeter and discharged into the Refinery effluent system. The GPS is designed to create a hydraulic barrier around the refinery's perimeter to prevent the offsite migration of groundwater contaminants. While we have limited data on the nickel content of the extracted groundwater, a review of groundwater analytical data from upgradient monitoring wells indicates the presence of dissolved nickel.
- Potable / Reclaimed Water: Both potable water and East Bay Municipal Utility District (EBMUD) reclaimed water (tertiary treated-wastewater) contain measurable amounts of nickel, probably as the result of potable water delivery systems containing nickel, brass, or other nickel alloys. The Refinery currently receives approximately 10.5 million gallons/day from these two water sources; of which 3 million gallons a day is currently reclaimed water. Reclaimed water and potable water are used as cooling water make-up as the towers lose water through evaporative cooling and blowdown. Potable water is also used for steam generation, landscaping,

and other process uses including crude oil desalting, tank cleaning, amine dilution, and in sour water concentrators. Water used for steam generation is processed through the Reverse Osmosis Plant to remove/reduce dissolved solids with the concentrated reject water sent to the Effluent Treatment System.

The refinery studied the nickel levels in cooling tower blowdowns, including the three cooling towers using reclaimed water and found that

- The FCC tower had about 19 ug/L nickel in the blowdown, nearly all of it dissolved;
- The RLOP tower had about 32 ug/L nickel in the blowdown, nearly all of it dissolved;
- The Isomax tower had about 50 - 100 ug/L nickel in the blowdown, or more, nearly all of it dissolved.
- The other tower blowdowns were either lower than these in nickel concentration, or were deemed to be insignificant because of small size.

B. Minimization / Reduction Practices: Current nickel minimization efforts focus on measures to minimize corrosion of the nickel alloy bundles in cooling water service, and to minimize the discharge of catalyst solids with wet catalyst dumps.

- Cooling Water Chemical Controls: Nickel contributions to the effluent system from cooling water towers are currently minimized with the use of chemical corrosion inhibitors, and through pH monitoring and control. This chemical corrosion inhibitor application applies a protective film to the body of the Cu/Ni or other nickel alloy bundles protecting them from the corrosive effects of cooling water. Corrosion is also monitored in the form of Admiralty (brass) Coupon analysis; coupons are placed in the tower basins and in side streams and monitored for signs of corrosion over time. Cooling water concentrations of nickel may increase with the use of EBMUD reclaimed water, but no noticeable increase has been documented to date. The Refinery currently has three cooling water towers (Isomax, RLOP, and FCC) utilizing reclaimed water. Use of reclaimed water is benefit to the community because it replaces potable water (which is therefore available for a higher use elsewhere) and to some degree it reduces the amount of contaminants which would be released to the bay if this sewage was discharged directly instead of being reused.
- Wet Dumping of Spent Catalysts: The process of "wet dumping" of spent catalysts is known to be a source of nickel. This minimization process involves clarifying wet-dump washwater in a system that minimizes

particulates, and thus metals in the wastewater. Catalyst fines are then separated out for off-site disposal and the segregated water discharged to the Effluent Treatment System.

C. Pollution Minimization Actions and Schedule

The Discharger agrees to participate in the development of a TMDL for NICKEL. The Discharger will give a written annual update to the RWQCB staff to document the discharger's participation toward progress in development of the TMDL.

Chevron will conduct any source control or pollution minimization studies in accordance with California Water Code §13263.3 and §2.1 of the SIP. In accordance with CWC §13263.3, this work will proceed outside of the NPDES permit itself, and will not be a condition of this permit.

E. Why schedule is as short as practical.

The Discharger and the RWQCB staff both recognize that the development of TMDLs will likely take longer than the permit term. The schedule for adoption of the TMDL determines the length of the compliance schedule and, on that basis, is as short as possible. The Discharger agrees to work with the staff to again evaluate the length of the compliance schedule during consideration of the Discharger's next NPDES permit.

# NICKEL Infeasibility Evaluation, May 2001

Table 1.0

## Chevron Richmond Refinery

### 3 Year Evaluation Period: November 1997 to October 2000\*

\* - Data based on existing permit application submittals

3 Yr			Order 92-111 Nickel (0.065 mg/l)					
	Days/Mth	(A) Flow mmgpd, Average monthly based on daily data		mg/l (ppm)	Lbs/day based on daily flowrate average (Col A)	Monthly Average Mass Loading, lbs/mth (Col A)	RAAM (lb/mth basis) based on Average monthly flowrate, daily data	RAAM (lb/day basis) based on Average monthly flowrate, daily data
Nov-97	30	8.34		0.019	1.322	39.670		
Dec-97	31	10.02		0.021	1.756	54.435		
Jan-98	31	12.10		0.043	4.342	134.599		
Feb-98	28	19.61		0.023	3.682	103.097		
Mar-98	31	8.13		0.019	1.289	39.961	44.12	1.461
Apr-98	30	6.73		0.020	1.118	33.529	45.56	1.509
May-98	31	6.08		0.024	1.213	37.591	46.65	1.544
Jun-98	30	5.43		0.017	0.779	23.382	48.60	1.609
Jul-98	31	5.21		0.016	0.691	21.430	48.89	1.618
Aug-98	31	4.56		0.016	0.597	18.520	47.90	1.586
Sep-98	30	4.67		0.015	0.577	17.303	46.67	1.545
Oct-98	31	5.85		0.013	0.615	19.068	45.22	1.498
Nov-98	30	6.65		0.032	1.748	52.442	46.28	1.534
Dec-98	31	7.98		0.017	1.139	35.301	44.69	1.483
Jan-99	31	7.04		0.024	1.398	43.345	37.08	1.237
Feb-99	28	10.80		0.004	0.361	10.094	29.33	0.960
Mar-99	31	8.55		0.019	1.320	40.919	29.41	0.963
Apr-99	30	6.78		0.030	1.720	51.600	30.92	1.013
May-99	31	4.81		0.043	1.732	53.705	32.26	1.056
Jun-99	30	4.47		0.034	1.268	38.048	33.48	1.097
Jul-99	31	4.11		0.020	0.672	20.839	33.43	1.096
Aug-99	31	5.10		0.038	1.630	50.531	36.10	1.182
Sep-99	30	4.26		0.023	0.832	24.956	36.74	1.203
Oct-99	31	5.66		0.004	0.189	5.857	35.64	1.167
Nov-99	30	5.22		0.026	1.124	33.716	34.08	1.115
Dec-99	31	5.63		0.017	0.785	24.323	33.16	1.086
Jan-00	31	10.03		0.016	1.348	41.775	33.03	1.082
Feb-00	29	15.97		0.022	2.985	86.572	39.40	1.300
Mar-00	31	9.55		0.019	1.514	46.940	39.91	1.317
Apr-00	30	5.74		0.022	1.054	31.614	38.24	1.261
May-00	31	6.05		0.018	0.909	28.172	36.11	1.192
Jun-00	30	5.75		0.022	1.060	31.813	35.59	1.175
Jul-00	30	5.98		0.021	1.023	30.690	36.41	1.204
Aug-00	31	5.31		0.035	1.538	47.666	36.17	1.197
Sep-00	30	5.50		0.018	0.831	24.922	36.17	1.197
Oct-00	31	5.48		0.014	0.640	19.847	37.34	1.234
Count 36			4/97 - 10/00	mg/l	lbs/day	lbs/mth	lbs/mth	lbs/day
			Limit (ppm)	0.0650				
			Min	0.0000	0.0000	0.00	29.33	0.96
			Avg	0.0209	1.2468	37.81	39.14	1.29
			Max	0.0432	4.3419	134.60	48.89	1.61829
Highlighted = PQL Value used in daily mass calculation RAAM - Running Annual Average Mean								